**WHAT IS CLAIMED IS:**

1. Integrated optoelectronic circuit components formed from a plurality of adjacent layers including sequential first, second and third layers on a substrate comprising:

at least one single heterojunction bipolar transistor formed from an emitter layer and from said first, second and third layers, where said first layer forms a transistor base, said second layer forms a transistor collector, and said third layer forms a transistor subcollector,

at least one p-i-n-i-p photodiode formed from said first, second and third layers, where said first layer forms a photodiode p-type layer, where said second layer forms a photodiode i-type layer, and said third layer forms a photodiode n-type layer.

2. The integrated optoelectronic circuit components of claim 1, further comprising:

a reflector formed from a plurality of layers between said at least one p-i-n-i-p photodiode and said substrate.

3. The integrated optoelectronic circuit components of claim 2, wherein said reflector is a distributed Bragg reflector.

4. The integrated optoelectronic circuit components of claim 1, wherein said p-i-n-i-p photodiode includes a metal interconnect between both of said p layers of said p-i-n-i-p photodiode.

5. The integrated optoelectronic circuit components of claim 1, wherein said substrate is an indium phosphide substrate.

6. The integrated optoelectronic circuit components of claim 5, wherein said single heterojunction bipolar transistor is an indium phosphide-based heterojunction bipolar transistor.

7. The integrated optoelectronic circuit components of claim 5, wherein the emitter material is InP, InGaAs, InAlAs, AlGaInAs, GaInAsP, or GaInAsSb.

8. The integrated optoelectronic circuit of claim 5, wherein the collector material is InP, InGaAs, InAlAs, AlGaInAs, GaInAsP, or GaInAsSb.

9. The integrated optoelectronic circuit components of claim 5, wherein the base material of said heterojunction bipolar transistor is InGaAs or an antimony-based material.

10. The integrated optoelectronic circuit components of claim 7, wherein said antimony-based material is GaAsSb.

11. The integrated optoelectronic circuit components of claim 1, wherein said substrate is a gallium arsenide substrate.

12. Integrated optoelectronic circuit components formed from a plurality of layers on a substrate comprising:

at least one p-i-n-i-p photodiode formed from said plurality of layers; and

at least one single heterojunction bipolar transistor formed from said plurality of layers

and including adjacent p, i, and n layers of said at least one p-i-n-i-p photodiode.

13. The integrated optoelectronic circuit components of claim 12, further comprising:

a reflector formed from a plurality of layers between said at least one p-i-n-i-p photodiode and said substrate.

14. The integrated optoelectronic circuit components of claim 13, wherein said reflector is a distributed Bragg reflector.

15. The integrated optoelectronic circuit components of claim 12, wherein said p-i-n-i-p photodiode includes a metal interconnect between both of said p layers of said p-i-n-i-p photodiode.

16. The integrated optoelectronic circuit components of claim 12, wherein said substrate is an indium phosphide substrate.

17. The integrated optoelectronic circuit components of claim 16, wherein said single heterojunction bipolar transistor is an indium phosphide-based heterojunction bipolar transistor.

18. The integrated optoelectronic circuit components of claim 16, wherein the emitter material is InP, InGaAs, InAlAs, AlGaInAs, GaInAsP, or GaInAsSb.

19 The integrated optoelectronic circuit of claim 16, wherein the collector material is InP, InGaAs, InAlAs, AlGaInAs, GaInAsP, or GaInAsSb.

20. The integrated optoelectronic circuit components of claim 16, wherein the base material of said heterojunction bipolar transistor is InGaAs or an antimony-based material.

21. The integrated optoelectronic circuit components of claim 18, wherein said antimony-based material is GaAsSb.

22. The integrated optoelectronic circuit components of claim 12, wherein said substrate is a gallium arsenide substrate.

23. Integrated optoelectronic circuit components formed from a plurality of layers on a substrate comprising:

a first group of said plurality of layers forming a reflector;

a second group of said plurality of layers on said first group and forming at least one bipolar transistor; and

a third group of said plurality of layers on said first group and forming at least one photodiode,

where said reflector is positioned to double-pass light through said at least one photodiode by reflecting light transmitted through said at least one photodiode back through said photodiode.

24. The integrated optoelectronic circuit components of claim 23, wherein said at least one heterojunction bipolar transistor has a base and a collector, and wherein said at least one photodiode has a junction formed by the layers that form the base and the collector of at least one heterojunction bipolar transistor.

25. The integrated optoelectronic circuit components of claim 24, wherein said at least one heterojunction bipolar transistor is a single heterojunction bipolar transistor.

26. The integrated optoelectronic circuit components of claim 23, wherein said photodiode is a p-i-n-i-p photodiode.

27. The integrated optoelectronic circuit of claim 25, wherein said at least one heterojunction bipolar transistor is an InP-based heterojunction bipolar transistor or a GaAs-based heterojunction bipolar transistor.

28. The integrated optoelectronic circuit of claim 24, wherein said at least one photodiode is a p-i-n-i-p photodiode.

29. The integrated optoelectronic circuit of claim 24, wherein said at least one photodiode is a p-i-n photodiode.

30. The integrated optoelectronic circuit of claim 23 wherein said reflector is a distributed Bragg reflector.

31. The integrated optoelectronic circuit of claim 30, wherein said at least one heterojunction bipolar transistor and said at least one photodiode InP based, and wherein said distributed Bragg reflector is an InP/InGaAs superlattice.

32. The integrated optoelectronic circuit of claim 30, wherein said at least one heterojunction bipolar transistor and said at least one photodiode InP based, and wherein said distributed Bragg reflector is an InP/InGaAs superlattice.